UNIVERSIDADE DA BEIRA INTERIOR

Ciências da Saúde

Bronchial Asthma in Portuguese University Students

Study of Prevalence and Risk Factors

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Abstract

Objectives – To determine the prevalence of asthma in Portuguese university students; to characterize their disease based on self-reported symptoms; and to identify possible risk factors for Asthma.

Methods – In this observational cross-sectional study, a sample of 1000 students were randomly selected and given a questionnaire in order to determine the prevalence of bronchial asthma. From the students who were identified and gave their consent, 548 answered a questionnaire. Those whose answers were compatible with a probable diagnosis of bronchial asthma were contacted, via phone call, in order to assess their asthma control. Multivariate statistical analyses were conducted using logistic regressions models to determine potential risk factors.

Results – A total of 578 students answered the questionnaire, and 121 were identified with self-reported symptoms compatible with asthma. Of these, 48.8% already had a previous diagnosis made by a doctor. 76% of the diagnosed students also had rhinitis. The triggers for asthma symptoms most reported by the students were common colds, exposure to pollens, house dust, tobacco smoke and weather changes. Of the students identified with self-reported asthma, 50.4% answered the phone call, and, of these, 62.3% had asthma symptoms that were not controlled in the previous month. From the factors potentially associated with increased risk of asthma, two of them significantly increased the risk of the disease: habits of regular smoking (OR = 2.09, 95%CI 1.21 to 3.62) and personal history of dermatitis/ atopic eczema (OR 2.65, 95%CI 1.55 to 4.54).

Conclusions – The prevalence of asthma in university students in Beira Interior, Portugal, was 20.9%. Only 48.8% of them had a previous diagnosis made by a doctor. Of those who allowed us to assess their asthma control, 62.3% were not controlled, and that may be related to infrequent medical follow up. Regular smoking and personal history of dermatitis/atopic eczema significantly increased the risk of having bronchial asthma.

Keywords

Asthma; Self-reported symptoms; Prevalence; University students; Risk-factors

Resumo

Objetivos - Determinar a prevalência de asma brônquica em estudantes universitários portugueses; caracterizar a sua doença com base em sintomas auto reportados; identificar possíveis fatores de risco para a asma.

Métodos – Neste estudo transversal observacional, uma amostra de 1000 alunos foi aleatoriamente selecionada para responder a um questionário de rastreio. O questionário foi entregue em papel, nas salas de aula, aos alunos identificados que deram o seu consentimento. Dos alunos identificados, 548 responderam ao questionário. Aqueles cujas respostas eram compatíveis com um provável diagnóstico de asma brônquica foram contactados, por via telefónica, com o objetivo de medir o controlo dos seus sintomas asmáticos no mês anterior. Para determinar potenciais fatores de risco de asma brônquica, foram efetuadas análises estatísticas multivariáveis, utilizando modelos de regressão logística.

Resultados – Um total de 578 alunos respondeu ao questionário, e 121 alunos foram identificados com sintomas auto reportados compatíveis com o diagnóstico de asma brônquica. Desses, 48,8% já tinham sido diagnosticados como asmáticos por um médico, e 76% deles tinham também rinite. Os fatores desencadeantes de sintomas asmáticos mais identificados pelos estudantes foram corizas, exposição a pólenes, pó de casa, fumo de tabaco e variações climáticas. Dos estudantes identificados com sintomas compatíveis com o diagnóstico de asma, 50,4% atenderam a chamada telefónica, e, desses, 62,3% tinham sintomas asmáticos não controlados no mês anterior. Dos fatores de risco potencialmente associados a um aumento de risco de asma brônquica, constatou-se que dois aumentavam significativamente o risco de desenvolver asma: hábitos de tabagismo regular (OR = 2,09, 95% IC 1,21 a 3,62) e história pessoal de dermatite/ eczema atópico (OR 2,65, 95% IC 1,55 a 4,54).

Conclusões – O valor de prevalência de asma brônquica nos estudantes universitários da Universidade da Beira Interior é de 20,9%. Destes, apenas 48,8% possuíam um diagnóstico prévio efetuado por um médico. Dos estudantes diagnosticados que nos permitiram medir o seu nível de controlo da asma, 62,3% não tinham os seus sintomas asmáticos controlados, podendo este facto estar relacionado com um irregular acompanhamento médico. Hábitos regulares de tabagismo e história pessoal de dermatite/eczema atópico aumentam significativamente o risco de asma brônquica.

Palavras-chave

Asma; Sintomas auto reportados; Prevalência; Estudantes universitários; Fatores de risco

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List of Acronyms

GINA	Global Initiative on Asthma
ERCHS	European Community Respiratory Health Survey
CARAT	Control of Allergic Rhinitis and Asthma Test
ARIA	Allergic Rhinitis and its Impact on Asthma
UBI	University of Beira Interior
OR	Odds Ratio
CI	Confidence Interval
FCSH	Faculty of Social and Human Sciences
FE	Faculty of Engineering
FCS	Faculty of Health Sciences
FAL	Faculty of Arts and Literature
FC	Faculty of Sciences

Introduction

Asthma is a reversible obstructive lung disease, caused by increased sensitivity of the airways to various stimuli. It is a chronic inflammatory condition with acute exacerbations that can be life-threatening if not properly managed. Asthma breathing problems usually happen in "episodes" or “attacks,” but the inflammation underlying asthma is continuous. An asthma episode includes a series of events that result in narrowed airways. These comprise: swelling of the lining, tightening of the muscle, and increased secretion of mucus in the airway. The narrowed airway is responsible for the difficulty in breathing with the familiar "wheeze." Asthma causes are poorly understood.(1) Episode triggers range from viral infections to allergies, irritating gases and particles in the air.

According to the Global Initiative for Asthma (GINA), this disease is one of the most prevalent preventable chronic respiratory disorders.(2) Asthma is a major cause for work and school absenteeism with repercussions on quality of life and high socio-economic impact.(3) Evidence that asthma prevalence may be increasing among children and young adults (1,4) raised new concerns about the need for the development of more effective procedures to communicate key information to both caregivers and patients, and to promote appropriate health behaviors, in order to improve care and, hence, the quality of life of those suffering from this disease.(2)

The European Community Respiratory Health Survey (ERCHS) elaborated a screening questionnaire to assess the variation in the prevalence of bronchial asthma. According to that study, the prevalence of the disease in Portuguese 20-44 years old general population, varied between 4,3% in Oporto, and 6,0% in Coimbra,(1) but there was no information regarding the Portuguese university students.

Screening questionnaires were also applied to university students in different countries, pointing values of asthma prevalence between 1,4% and 14,1% but there are currently no studies about asthma prevalence in Portuguese university students.(1,4-7)

It is also important to assess the control of the asthmatic symptoms, the triggers that exacerbate the symptoms thereby worsening the control of the disease, and the potential risk factors for the development of bronchial asthma, issues that have been given less or no importance in other studies.(1,4-7) The lack of symptom control suggests the need to increase or change the prescribed medication, and, therefore, in order to assess asthma control, we gave the Control of Allergic Rhinitis and Asthma Test (CARAT) questionnaire to the population of asthmatic students under study, as recommended by the Allergic Rhinitis and its Impact on Asthma (ARIA).(8) The identification of asthma triggers and risk factors is

important because by avoiding them, patients can reduce symptom frequency and/or severity and the the risk of developing an asthma bout. In turn, this potentially allows them to reduce medication and to improve their life quality.(9) Given the lack of information regarding the prevalence, features and control of asthma symptoms in University students in Portugal, our study aimed to determine the prevalence of bronchial asthma in this population. However, secondary goals were to measure the control of asthma symptoms, and to identify the triggers and potential risk factors for the development of the disease in these students.

Objectives

The aims of our study were:

1. to determine the prevalence of asthma in Portuguese university students;
2. to characterize their disease based on self-reported symptoms;
3. to identify possible risk factors for asthma.

Methods

Study design

We conducted an observational cross-sectional study in two phases. The first one took place between 3rd May and 8th June 2011, and aimed to identify students with symptoms suggesting a probable diagnosis of bronchial asthma. In the second phase, during October 2011, those students were contacted by phone in order to assess their asthma control.

Subjects

Out of 6161 students registered at the University of Beira Interior (UBI), 1000 were randomly selected for this study. This sample size was based on the estimated asthma prevalence for general population between 4,3% and 6,0%,(1) for a Confidence Interval of 95%, using an absolute precision of 2% and a predicted response rate of 50%. The study sample was stratified by Faculty, according to their proportion of students within the UBI.

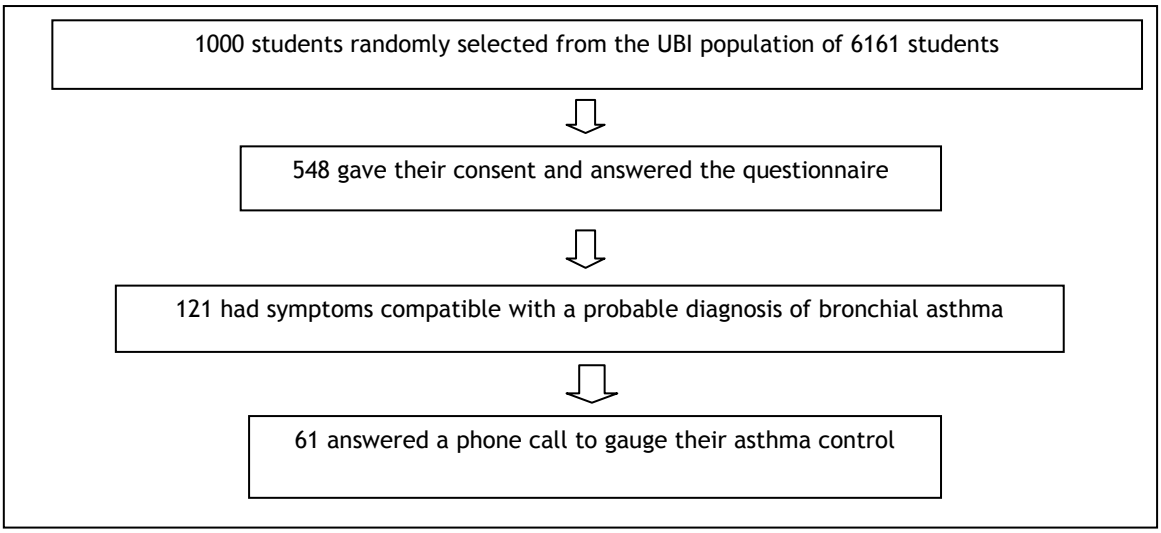

Figure 1: Flowchart of the study design.

Questionnaire

A written screening questionnaire was filled in by the recruited students in classrooms. The questionnaire included demographic characteristics, questions relating to the 12 month prevalence of asthma symptoms, to which some questions about the characterization of the disease and risk-factors were added.

Asthma Control

To measure asthma control, students whose answers indicated the presence of asthma, were asked about their symptoms in the previous month, using the Control of Allergic Rhinitis and Asthma Test (CARAT), as recommended by the Allergic Rhinitis and its Impact on Asthma (ARIA).(8) This assessment was carried out via phone call.

Statistical analysis

Demographic variables and clinical data of the students included in the study were examined on a descriptive basis and expressed as absolute or relative frequencies for categorical variables, and means (standard deviation) for continuous variables. Multivariate statistical analyses were conducted using logistic regressions models to determine potential risk factors of bronchial asthma in university students, adjusting for age and sex. Effect measures are expressed as crude and adjusted odds ratio (OR), including 95% confidence intervals.

All statistical analyses were performed using SPSS for Windows, version 19.0 (SPSS Inc., Chicago, IL).

Results

Response

A total of 578 students answered the questionnaire, of whom 349 were females (60.4%) and 229 were males (39.6%), with a mean age of 21.97 ± 4.87 years (range 18-63 years). Table 1 shows the demographic characteristics of the students who answered the questionnaire, and of those identified with self-reported asthma.

Table 1 - Demographic characteristics of the students who answered the questionnaire, and of the students identified with self-reported asthma

	Median	**Range (Min - Max)**	**% Male**	**% Female**
Students who answered the questionnaire	21	45 (18 – 63)	39.6	60.4
Students identified with self-reported asthma	20	26 (18-44)	38.8	61.2

Asthma symptom prevalence

The presence of symptoms of bronchial asthma, [defined as a positive answer to Question 1 ("presence of wheezing in the past 12 months") and/or Question 9 ("currently taking medicine for asthma")], as detected in each faculty is shown in Table 2.

Table 2 - Asthma prevalence by Faculty (95% confidence intervals)

	Recruited sample	Participants	k	Prevalence (%)	IC 95%
Total	1000	578	121	20.93	[17.81-24.43]
FCSH	273	161	39	24.22	[18.25-31.39]
FE	269	151	27	17.88	[12.59-24.76]
FCS	223	143	33	23.08	[16.93-30.64]
FAL	174	87	17	19.54	[12.57-29.08]
FC	61	36	5	13.89	[6.08-28.66]

Participants: total of individuals who answered the questionnaire ; k: individuals who answered positive to Question 1 and/or Question 9; FCSH: Faculty of Social and Human Sciences; FE: Faculty of Engineering; FCS: Faculty of Health Sciences; FAL: Faculty of Arts and Literature; FC: Faculty of Sciences

Overall, 121 students were identified with self-reported symptoms compatible with asthma, giving an overall prevalence of self-reported asthma of 20.93% (17.81-24.42%), with similar estimations among different Faculties. These students had a mean age of 21.32 ± 3.40 years, 47 (38.8%) students were male and 74 (61.2%) were female. Table 1 shows the demographic characteristics of the students.

Students detected with self-reported asthma had various disease-associated manifestations, which are described in Table 3. Most of the students with a positive questionnaire for asthma were detected by self-reported wheezing (94.2%). Almost 22% reported an asthma bout within the previous 12 months.

Table 3 - Frequency of symptoms, and clinical characteristics of the disease

	Frequency	Percent (%)
Wheeze	114	94.2
Wheeze with breathlessness	34	28.1
Wheeze without a cold	78	64.5
Waking with tightness in the chest	50	41.3
Waking with breathlessness	17	14.0
Waking with cough	77	63.6
Asthma bout	26	21.5
Wheeze, dry cough or breathlessness after exercise	61	50.4
Rhinitis	92	76.0

Of the population identified with asthma, only 48.8% already had a previous diagnosis made by a doctor. In addition, most of the asthmatic students (76%) had rhinitis.

Triggers for asthma symptoms

The triggers reported by the students with asthma-symptoms are shown in Table 4. Common colds, exposure to pollens, house dust, tobacco smoke or weather changes were the most reported triggers.

Table 4 – Triggers for Asthma symptoms

Triggering factors	Weather	Pollens	House dust	Food (meals)	Tobacco smoke
n (%)	43.8	58.7	45.5	5	43
Triggering factors	Other fumes	Emotions	Wool clothes	Meds	Spray
n (%)	14	5.8	5.8	5	8.3
Triggering factors	Flu episodes	Pets (animals)	Work	Exercise	Other
n (%)	59.5	29.8	2.5	33.1	3.3

Asthma Control

Of the students who reported asthma symptoms, 50.41% (61 students) answered the phone call made to assess their asthma control in the previous month.

The CARAT questionnaire for the lower airways showed that about 62% of the students had asthma symptoms that were not controlled (score $\leq$ 16) (Table 5). Furthermore, rhinitis symptoms were not controlled (score $\leq$ 8) in almost 74% of asthmatic students.

Table 5 - CARAT questionnaire results

	Frequency	Percent (%)
Control of the upper airways (score of items 1-4 >8)	16	26.23
Control of the lower airways (score of items 5-10>16)	23	37.70
Good control (total score >24)	17	27.87
Total answers	61	

Risk Factors

In order to identify asthma-associated risk-factors, we used logistic regressions models, adjusting for age and sex. Odds ratios (OR) and 95% confidence intervals were estimated (Table 6). From the factors potentially associated with increased risk of bronchial asthma, two of them significantly increased the risk of asthma: habits of regular tobacco smoking (OR = 2.09, 95%CI 1.21 to 3.62) and personal history of dermatitis/ atopic eczema (OR 2.65, 95%CI 1.55 to 4.54).

Table 6: Associations between Bronchial Asthma-Symptoms and Risk-Factors in University Students

	Crude OR (95% CI)	Adjusted OR[a] (95% CI)
Residence		
Urban residence		
Rural residence (village)	1.07 (0.68-1.68)	0.98 (0.61-1.58)
Rural residence (farm)	0.57 (0.13-2.57)	0.61 (0.13-2.76)
Carpeted house	1.48 (0.79-2.77)	1.57 (0.82-3.03)
Fungus/mold on the walls/ceiling	1.53 (0.80-2.94)	1.53 (0.78-3.01)
No animals	0.79 (0.53-1.18)	0.89 (0.58-1.35)
Animals in the backyard	1.22 (0.79-1.88)	1.17 (0.75-1.84)
Animals at home	1.17 (0.75-1.83)	1.02 (0.63-1.64)
Dog	1.21 (0.80-1.83)	1.05 (0.68-1.61)
Cat	1.18 (0.75-1.84)	1.08 (0.67-1.74)
Birds	0.90 (0.47-1.71)	0.88 (0.45-1.71)
Smoking		
Never smoked		
Former smoker	1.71 (0.73-4.04)	1.30 (0.46-3.71)
Regular smoker	**1.94 (1.14-3.30)***	**2.09 (1.21-3.62)***
Occasional smoker	1.52 (0.93-2.48)	1.45 (0.87-2.41)
Personal History		
Dermatitis/atopic eczema	**2.65 (1.59-4.40)***	**2.65 (1.55-4.54)***
Food allergies	1.28 (0.22-7.49)	1.39 (0.23-8.27)
Family History		
Father with Asthma/Bronchial Asthma		
with Allergic Rhinitis	0.79 (0.27-2.29)	0.54 (0.17-1.69)
with both Asthma/Bronchial Asthma and Allergic Rhinitis	0.89 (0.07-11.22)	0.84 (0.06-11.14)
Mother with Asthma/Bronchial Asthma		
with Allergic Rhinitis	0.68 (0.27-1.72)	0.71 (0.25-1.97)
with both Asthma/Bronchial Asthma and Allergic Rhinitis	1.02 (0.22-4.72)	1.16 (0.23-5.85)
Siblings with Asthma/Bronchial Asthma		
with Allergic Rhinitis	1.05 (0.42-2.63)	1.01 (0.38-2.66)
with both Asthma/Bronchial Asthma and Allergic Rhinitis	2.36 (0.61-9.17)	3.00 (0.69-13.02)
Paternal grandparents with Asthma/Bronchial Asthma		
with Allergic Rhinitis	2.13 (0.46-9.81)	1.86 (0.38-9.12)
with both Asthma/Bronchial Asthma and Allergic Rhinitis	0.85 (0.07-10.61)	1.14 (0.08-17.24)
Maternal grandparents with Asthma/Bronchial Asthma		
with Allergic Rhinitis	3.38 (0.92-12.49)	4.95 (1.18-20.82)
with both Asthma/Bronchial Asthma and Allergic Rhinitis	4.03 (0.92-17.64)	6.14 (1.17-32.20)

a.adjusted for sex and age. *. significant for a confidence level of 5%.

Discussion

In this study whose aim was to determine, for the first time, the prevalence of bronchial asthma in Portuguese university students, we observed that 20.9 % of the students had symptoms compatible with a probable diagnosis of the disease. Most of them (94.2%) reported wheezing in the past 12 months, and almost 22% had had an asthma bout during that period. Only 48.8% had a previous diagnosis made by a doctor, and a significant sample of these showed that in a high proportion of them (62%) bronchial asthma was not controlled. Finally, our study also showed that regular smoking and a personal history of dermatitis/atopic eczema significantly increase the risk of bronchial asthma.

The prevalence of self-reported asthma in our sample of students was higher than that expected for young adults, as reported in other studies using a similar, questionnaire-based approach. In this context, Ishizuka et al(5) reported a prevalence of 7.2% for asthma symptoms in Japanese university students. In another study, carried ou in Turkey, Onbasi et al(6) reported 1.4% as the prevalence of asthma for the past 12 months in university students, although the authors describe 9.6% of self-reported wheezing in the previous 12 months in the same population. Both of these studies used the ECRHS questionnaire in their methodology. In Nigeria, Erhabor et al(7) detected a prevalence of probable asthma of 14.1%, in university students. These authors also reported a prevalence of 3.9% of suspected asthma. The discrepancy between the results of our study and those from the other studies may be due to several causes. Apart from the fact that genetic differences between populations may underlie the differences observed, we believe that variations in the set of symptoms accepted by different authors as diagnostic criteria for asthma may be the most relevant explanation. Whereas Ishizuka et al(5) considered wheezing, a nocturnal feeling of tightness in the chest, a nocturnal attack of shortness of breath, or a nocturnal attack of cough in the last year as diagnostic criteria for asthma, and these authors further selected from that sample individuals those who had a fractional concentration of nitric oxide in exhaled air greater than 38.0 ppb, Erhabor et al(7) considered responders with one or two symptoms as suspected asthmatics, and those with three or more symptoms or those previously diagnosed with asthma as probable asthmatics. In the ECRHS study, the authors only considered those with an asthma attack or taking medicines for asthma in the previous 12 months.

In our study, we identified as probable asthmatics the responders who reported wheeze or who had been taking medicines for asthma in the previous 12 months, because wheeze is the most sensitive and specific symptom for the diagnosis of asthma (5,10) and specifically asking if medicines are being taken for asthma strongly supports the possibility that these individuals have indeed been diagnosed the condition and are being followed up for it.

However, although there may exist differences in the criteria considered diagnostic in the different studies, the discrepancy in the prevalence values is too high be ignored and may indeed be partly due to an increase in the prevalence of asthma. In Portugal, the only study of the prevalence of bronchial asthma in a population of young adults was carried out by Burney et al(1) in 1996 and showed a prevalence of asthma of 6.0% in Coimbra and 4.3% in Oporto. Although this ECHRS study was a general population-based and not a university student-focused one, the methodological approach was similar to ours and joint analysis of that study and our study may point towards an possible increase in the prevalence of bronchial asthma in the age range of university students, although this should be specifically addressed in a new study designed with that purpose. It should also be stressed that our study is the first Portuguese study attempting to assess the prevalence of bronchial asthma in University students. In any case, the possibility of an increase in the prevalence of bronchial asthma in young adults is not novel since other studies have demonstrated an increasing prevalence of bronchial asthma in this age range.(1-4,11-13)

Another very important issue raised by our study is that the high value of prevalence of self-reported asthma in our study (20.93% [17.81-24.42%]), together with the low percentage of students who had been diagnosed as having asthma or who were being followed up after a diagnosis had been made by a doctor, suggest that bronchial asthma is currently under diagnosed in Portuguese University students. The hypothesis that the high prevalence of asthma found in our study in fact correlates with the existence of under diagnosed pathology is strengthened by the fact that our sample also presents more asthma-like symptoms. In fact, besides the two criteria we considered as indicative of probable asthma, in the group of asthmatic patients we identified there was also a high prevalence of other asthma-like symptoms in the last 12 months since 64.5% had wheezing without cold, nearly 64% had nocturnal cough, 50% had exercise dyspnoea, 41.3% had nocturnal chest tightness, 28% had wheezing with dyspnoea, 21.5% had had an asthma bout, and 14% had rest dyspnoea.

One of the most important issues in asthma studies is to assess the presence of other allergic co-morbidities. In this context, it is crucial to check whether the patient has concurrent allergic rhinitis. In our study, 76% of the asthmatic students had rhinitis, which is consistent with that reported by other studies in different age ranges.(14) In fact, rhinitis is a frequent co-morbid condition in asthmatic patients and it has, in fact, been demonstrated as a highly significant risk factor for the development of asthma.(15,16) Even though studies indicate rhinitis is more frequently associated with allergic than with non-allergic asthma, it can occur in both types of asthma.(3)

Many triggers were reported by the students with asthma symptoms, and they were similar to triggers reported in other studies.(6,9) Viral infections are important triggers of acute asthma symptoms in susceptible persons. Studies have shown that 80% of asthma exacerbations in

school-aged children, and 50% of all asthma exacerbations in adults are associated with viral upper respiratory infections, mainly due to Rhinovirus.(17) According to literature, pollens, the second most reported trigger in our study, are also one of the major sensitizers for allergic asthmatics.(3) Since University of Beira Interior is located in a highly pollinated area, it is expected that some pollens may be associated with seasonal asthma in students. In any case, house dust mites were also detected as a major trigger for asthma symptoms in our sample of asthmatic university students. The identification of asthma triggers is important because avoiding them, patients can avoid symptoms and asthma bouts, which may reduce personal morbidity and mortality and thus reduce healthcare medication- associated costs.(9)

Our study was also innovative since it is, as far as we know, the first study that attempted to study the control of symptoms in University students with bronchial asthma. Bugalho(18) draws attention to the fact that about 700,00 patients with active asthma in Portugal have not reached control levels that enable them and their families to have proper quality of life.

Lack of symptom control suggests the need to increase or change the prescribed medication. In order to assess symptom control, we applied the CARAT questionnaire to the population of asthmatic students under study, as recommended by ARIA.(8) Using this tool, asthma was not controlled in 62.3% of the students. Furthermore, in 74% of these asthmatic students rhinitis was similarly not controlled. This may be due to the low percentage of students who had a previous diagnosis of asthma symptoms or who were followed up by a doctor, or following a correct therapeutic plan. In addition, symptom denial or poor symptom perception, as well as refusal to undergo treatment, may also be implicated.(12) These difficulties in controlling asthma symptoms may be related to the fact that most university students are away from their hometowns and academic life exposes them to different housing and new environmental conditions, which may influence their exposure to different triggers. Control of rhinitis symptoms is also important because, allergic rhinitis is also a major risk factor for poor asthma control.(19)

Finally, our study was showed novel data regarding possible risk factors for bronchial asthma in Portuguese university students. In this regard, our study showed a strong correlation between asthma and regular smoking habits (OR = 2.09, 95%CI 1.21 to 3.62) and personal history of dermatitis/ atopic eczema (OR 2.65, 95%CI 1.55 to 4.54). Both are risk factors described in the literature. In terms of tobacco smoking, Fernandez-Benitez et al(20) reported that smoking in adolescents was significantly associated with previous experience of asthma symptoms at some point in time (OR 1.75 ($p<0.001$)). In Italy, Polosa et al(21) showed that smoking was significantly associated with the risk of incident asthma (OR- 2.67; 95% CI: 1.70-4.19). As far as atopic dermatitis is concerned, Litonjua et al(22) showed that asthma was more commonly present in individuals with atopic dermatitis and other atopic diseases, although only about one third of children with atopic dermatitis will go on to develop asthma.

Limitations of our study

The principal limitation of this study is that is based on self-reported symptoms. Future studies associating spirometric measurements, determination of nitric oxide levels in exhaled breath and analysis of bronchial hiperresponsiveness may be crucial in further clarifying the prevalence, clinical features and control of fully diagnosed cases of bronchial asthma.

Of the many other risk factors tested in our study, it is possible that the sample stratified by risk factors was not strong enough to detect differences in other variables because the size of the sample was calculated in order to study prevalence.

Overall, our sample size should be larger and, preferably involving students from other Universities, in order to have a cross-sectional picture of the global situation of asthma prevalence and clinical features in Portuguese university students.

Strenghts of our study

Our study is the first one to study the prevalence and control of bronchial asthma in Portuguese university students. Once the sample was not recruited from clinical files, it is unlikely that our findings are biased by an over proportion of subjects with pathology. The use of questionnaires allows us to reach a wider sample. Although our study does not allow us to make inferences about Portuguese university students in general, university students in UBI are from different regions of the country which may reflect the global situation of asthma prevalence in this age range. Identifying a possibly deathful pathology in students with symptoms compatible with a probable diagnosis of bronchial asthma, which was not diagnosed in many of them or which was not under control, may contribute towards a potential improvement in the quality of life of the students that participated in the study.

Conclusions

The prevalence of asthma in university students in Beira Interior, Portugal, was 20.9%, as based on self-reported asthma symptoms compatible with a probable diagnosis of asthma. Only 48.8% of these had a previous diagnosis made by a doctor. Of those who allowed us to assess their asthma control, 62.3% were not controlled. Regular smoking and a personal history of dermatitis/atopic eczema significantly increase the risk of bronchial asthma.

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Attachments

Attachment 1 – Screening questionnaire

Questionário de Rastreio

I__I__I__I__I__I__I

DADOS PESSOAIS

NOME:_____ Sexo : M ❑ F ❑

CURSO:_____ Ano _____

DATA NASCIMENTO: _____/_____/_____ Telefone_____

e-mail_____

PERGUNTAS SOBRE SINTOMAS RESPIRATÓRIOS

1. Alguma vez nos últimos 12 meses teve pieira ou "gatinhos no peito"?

   Sim ❑ Não ❑

   Caso tenha respondido "**Não**", vá para a pergunta 2. Se respondeu "**Sim**" :

   1.1 Enquanto a pieira estava presente, alguma vez se sentiu completamente com falta de ar?

   Sim ❑ Não ❑

   1.2 Teve essa pieira ou "gatinhos no peito" em períodos durante os quais **não** estava constipado ou com gripe?

   Sim ❑ Não ❑

2. Alguma vez nos últimos 12 meses acordou com sensação de aperto no peito?

   Sim ❑ Não ❑

3. Alguma vez nos últimos 12 meses acordou com um ataque de falta de ar?

   Sim ❑ Não ❑

4. Alguma vez nos últimos 12 meses acordou com um ataque de tosse?

   Sim ❑ Não ❑

5. Alguma vez nos últimos 12 meses teve um ataque de asma?

   Sim ❑ Não ❑

6. Que factores agravam esses sintomas?

   O tempo ❑
   Pólens ❑
   Pó de casa ❑
   Comidas / Bebidas ❑
   Fumo do Tabaco ❑
   Outros Fumos ❑
   Emoções ❑
   Roupa de Lã ❑
   Medicamentos ❑
   Sabões / Spray / Detergentes ❑
   Constipações / Gripes ❑
   Animais de estimação ❑
   Trabalho ❑
   Exercício Físico ❑
   Outros ❑
   Quais ? _____
   _____

7. Nos últimos 12 meses teve "pieira", tosse seca ou falta de ar durante ou depois de fazer exercício?

   Sim ❑ Não ❑

8. Alguma vez lhe foi feito um diagnóstico de asma brônquica por algum médico?

   Sim ❑ Não ❑

9. Está a tomar medicação para asma brônquica?

   Sim ❑ Não ❑

PERGUNTAS SOBRE RINITE

(Todas estas perguntas se referem a situações em que <u>não está</u> constipado/a ou com gripe)

10. Alguma vez teve espirros, o nariz "a correr" ou o nariz tapado sem estar constipado ou com gripe?

    Sim ❑ Não ❑

PERGUNTAS SOBRE RESIDÊNCIA ACTUAL (onde passa a maior parte do seu tempo)

11. Como é a sua residência?

Urbana ❑
Rural (aldeia/vila) ❑
Rural (quinta) ❑

12. A sua casa é alcatifada?

Sim ❑ Não ❑

13. A sua casa tem fungos/bolores nas paredes/tecto?

Sim ❑ Não ❑

14. Tem animais?

Não ❑
Sim, no quintal ❑
Sim, em casa ❑

15. Que animais tem?

Cão ❑
Gato ❑
Pássaros ❑

PERGUNTAS SOBRE HÁBITOS TABÁGICOS

16. Quais são os seus hábitos tabágicos?

Nunca fumei ❑
Sou ex-fumador/a ❑
Sou fumador/a regular ❑
Sou fumador/a ocasional ❑

PERGUNTAS SOBRE ANTECEDENTES PESSOAIS

17. Tem ou alguma vez teve Dermatite / Eczema atópico? Sim ❑ Não ❑
18. Tem ou alguma vez teve Alergias alimentares? Sim ❑ Não ❑

PERGUNTAS SOBRE ANTECEDENTES FAMILIARES

19. Assinale na tabela com um X as alergias que conheça na sua família:

Familiar	Asma/bronquite asmática	Rinite alérgica
Pai		
Mãe		
Irmãos		
Avós Paternos		
Avós Maternos		

❑ Preencha caso não autorize ser contactado posteriormente para dar seguimento a este estudo.

Attachment 2 – CARAT questionnaire

Controlo da Asma e Rinite Alérgica - Teste

Por favour, assinale com uma cruz (☒).

Por causa das suas doenças alérgicas respiratórias (asma/rinite/alergia), em média nas últimas 4 semanas quantas vezes teve:

		Nuncar	Até 2 dias por semana	Mais de 2 dias por semana	Quase todos ou todos os dias
1.	**Nariz entupido?**	☐3	☐2	☐1	☐0
2.	**Espirros?**	☐3	☐2	☐1	☐0
3.	**Comichão no nariz?**	☐3	☐2	☐1	☐0
4.	**Corrimento/ pingo no nariz?**	☐3	☐2	☐1	☐0
5.	**Falta de ar/dispneia?**	☐3	☐2	☐1	☐0
6.	**Chiadeira no peito/ pieira?**	☐3	☐2	☐1	☐0
7.	**Aperto no peito com esforço físico?**	☐3	☐2	☐1	☐0
8.	**Cansaço/ dificuldade em fazer as suas actividades ou tarefas do dia-a-dia?**	☐3	☐2	☐1	☐0
9.	**Acordou durante a noite por causa das suas doenças alérgicas ou respiratórias?**	☐3	☐2	☐1	☐0
		Não estou a tomar medicamentos	**Nunca**	**Menos de 7 dias**	**7 ou mais dias**
10.	**Nas últimas 4 semanas, quantas vezes teve de aumentar a utilização dos seus medicamentos por causa das suas doenças alérgicas respiratórias asma/ rinite/alergia?**	☐3	☐3	☐2	☐0

Pontuações superiores a **24** indicam bom controlo da doença.

Pontuação vias aéreas superiores (item 1-4): Controlado se pontuação for **>8**

Pontuação vias aéreas inferiores (item 5-10): Controlado se pontuação for **≥16**